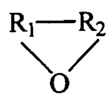
Listing of Claims:

Claim 1 (currently amended): An integrated process for the production of a dialkyl carbonate and a diol from an alkylene oxide, carbon dioxide and an aliphatic monohydric alcohol comprising:

(a) reacting an alkylene oxide with carbon dioxide in the presence of a homogeneous carbonation catalyst at a temperature in the range of about 50 to 250 °C and at a pressure of at least about 1379 kPa (200 psi) to provide a crude cyclic carbonate stream comprising a cyclic carbonate and homogeneous carbonation catalyst in an amount of 0.1 to 5 wt%; and

(b) reacting said cyclic carbonate with an aliphatic monohydric alcohol in the presence of said homogeneous carbonation catalyst to provide a crude product stream comprising a dialkyl carbonate and diol.

Claim 2 (original): The process of Claim 1, wherein said alkylene oxide is of the formula:



wherein R_1 and R_2 independently of one another denote a divalent group represented by the formula $-(CH_2)_m-$, wherein m is an integer from 1 to 3, which is unsubstituted or substituted with at least one substituent selected from the group consisting of C_1-C_{10} alkyl group and a C_6-C_{10} aryl group, wherein R_1 and R_2 can share the same substituent; and

said aliphatic monohydric alcohol is of the formula:

$$R_3\text{-}OH$$

wherein R_3 is a monovalent aliphatic C_1-C_{12} hydrocarbon group which is unsubstituted or substituted with at least one substituent selected from the group consisting of a C_1-C_{10} alkyl group and a C_6-C_{10} aryl group.

Claim 3 (original): The process of Claim 1, wherein said homogeneous carbonation catalyst comprises a basic component and a halide containing component.

Claim 4 (original): The process of Claim 3, wherein said basic component is selected from the group consisting of: carbonates, bicarbonates, acetates, amines, phosphines and mixtures thereof, and said halide containing component is selected from the group consisting of: alkali halides, quaternary ammonium halides and mixtures thereof.

Claim 5 (original): The process of Claim 1, wherein said pressure is in the range of about 3448 kPa to 6897 kPa (500 to 1000 psig) and the temperature is in the range of about 150 to 200°C.

Claim 6 (original): The process of Claim 1, wherein the molar ratio of CO_2 to alkylene oxide is in the range from about 1.05 to 1.10 and the molar ratio of aliphatic monohydric alcohol to cyclic carbonate is in the range from about 2:1 to 6:1.

Claim 7 (original): The process of Claim 1, wherein said crude cyclic carbonate stream further comprises glycol impurities in an amount of up to 40% by weight, based upon total weight of said crude cyclic carbonate stream.

Claim 8 (original): The process of Claim 7, wherein said cyclic carbonate is ethylene carbonate, said aliphatic monohydric alcohol is methanol, and said glycol impurities comprise ethylene glycol and higher molecular weight glycols.

Claim 9 (original): The process of Claim 1, wherein said aliphatic monohydric alcohol contains dialkyl carbonate in an amount of up to 40% by weight, based upon the total weight of said aliphatic monohydric alcohol and said dialkyl carbonate.

Claim 10 (original): The process of Claim 1, further comprising a step of recovering said dialkyl carbonate and said diol from said crude product stream.

Claim 11 (original): The process of Claim 1, further comprising:

(i) separating a first recycle stream comprising unreacted aliphatic monohydric alcohol from said crude product stream;

(ii) recycling said first recycle stream to transesterification step (b);

(iii) separating a second recycle stream comprising unreacted cyclic carbonate and said homogeneous carbonation catalyst from said crude product stream; and

(iv) recycling at least a portion of said second recycle stream to said carbonation step (a) and/or at least a portion of said second recycle stream to said transesterification step (b).

Claim 12 (original): The process of Claim 2, wherein said cyclic carbonate is ethylene carbonate and said aliphatic monohydric alcohol is methanol.

Claim 13 (original): The process of Claim 1, wherein said transesterification step (b) occurs in a reaction vessel selected from the group consisting of: a reactive distillation column, a distillation column with at least a plurality of reaction zones, a distillation column with a plurality of reaction zones having heat exchangers disposed between the distillation column and each reaction zone, and a distillation column with a plurality of reaction zones wherein bottoms thereof are optionally recycled to the distillation column.

Claims 14-54 (canceled)

Claim 55 (new): An integrated process for the production of a dialkyl carbonate and a diol from an alkylene oxide, carbon dioxide and an aliphatic monohydric alcohol consisting essentially of:

(a) reacting an alkylene oxide with carbon dioxide in the presence of a homogeneous carbonation catalyst at a temperature in the range of about 50 to 250 °C and at a pressure of at least about 1379 kPa (200 psi) to provide a crude

cyclic carbonate stream comprising a cyclic carbonate and homogeneous carbonation catalyst; and

(b) reacting said cyclic carbonate with an aliphatic monohydric alcohol in the presence of said homogeneous carbonation catalyst to provide a crude product stream comprising a dialkyl carbonate and diol.

Claim 56 (new): An integrated process for the production of a dialkyl carbonate and a diol from an alkylene oxide, carbon dioxide and an aliphatic monohydric alcohol comprising:

(a) reacting an alkylene oxide with carbon dioxide in the presence of a homogeneous carbonation catalyst at a temperature in the range of about 150 to 200 °C and at a pressure of at least about 1379 kPa (200 psi) to provide a crude cyclic carbonate stream comprising a cyclic carbonate and homogeneous carbonation catalyst;

(b) reacting said cyclic carbonate with an aliphatic monohydric alcohol in the presence of said homogeneous carbonation catalyst at a temperature range of about 75 to 170 °C to provide a crude product stream comprising a dialkyl carbonate and diol;

(c) separating a first recycle stream comprising unreacted aliphatic monohydric alcohol from said crude product stream;

(d) recycling said first recycle stream to transesterification step (b);

(e) separating a second recycle stream comprising unreacted cyclic carbonate and said homogeneous carbonation catalyst from said crude product stream; and

(f) recycling at least a portion of said second recycle stream to said carbonation step (a) and/or at least a portion of said second recycle stream to said transesterification step (b).

Remarks/Arguments

Claims 1-13 and new claims 55-56 are pending in this application after entry of the present amendment. Claim 1 has been amended and claims 14-54 have been canceled. In view of the examiner's earlier restriction requirement, applicant retains the right to present claims 14-54 in a divisional application.

Applicants thank Examiner Stockton for the courtesy of a telephone interview on May 20, 2003, and for withdrawing the Buchanan et al. reference under obviousness-type double patenting and 35 U.S.C. § 103.

Claim 1 has been amended to clarify the concentration of the homogeneous carbonation catalyst in the crude cyclic carbonate stream.

Claims 1 through 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,434,105 to Buysch et al. (Buysch) and Chem Systems "Developments in Dimethyl Carbonate Production Technologies" 99/00S6, May 2000 (Chem Systems), each taken alone or in combination with each other.

Claim 1 recites an integrated process for producing a dialkyl carbonate and a diol that comprises reacting an alkylene oxide with carbon dioxide in the presence of the homogeneous carbonation catalyst at 150 to 200 °C and 1379 kPa to provide a crude cyclic carbonate stream comprising a cyclic carbonate and the homogeneous carbonation catalyst. The cyclic carbonate is then reacted with an aliphatic monohydric alcohol in the presence of the homogeneous carbonation catalyst from the crude carbonate stream to provide a crude product stream comprising a dialkyl carbonate and a diol.